

WHAT IS CLAIMED IS:

5 1. A method for processing a discharge ports of an ink jet head provided with the discharge port for discharging ink and a discharge port plate having said discharge port, comprising the following steps of:

closely contacting the mask plate having opening in the form of said discharge port with the face of the said discharge port plate on the ink discharge side; and

10 forming said discharge port on said discharge port plate by irradiating plural high energy ultraviolet parallel beams simultaneously through said mask plate in the direction inclined at a specific angle to the vertical axis of the mask plate face.

15 2. A method for processing the discharge port of an ink jet head according to Claim 1, wherein the irradiation of the plural high energy ultraviolet parallel beams is incident upon in the direction
20 inclined at the same angle to the vertical axis of the mask plate.

25 3. A method for processing the discharge port of an ink jet head according to Claim 1, wherein the irradiation of the plural high energy ultraviolet parallel beams is incident upon in the direction equally divided with respect to the circumferential

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directions of the mask plate.

4. A method for processing the discharge port of an ink jet head according to Claim 1, wherein the high energy ultraviolet parallel beams are formed by two beams, and each of the beams is inclined at a specific angle symmetrical to the vertical axis of the mask plate, and then, irradiated in the direction at right angles to the arrangement direction of the discharge port.

5. A method for processing the discharge port of an ink jet head according to Claim 1, wherein the high energy ultraviolet parallel beams are formed by four beams, and each of the beams is inclined at a specific angle to the vertical axis of the mask plate, and then, irradiated in the direction equally divided with respect to the circumferential directions of the vertical axis and in the direction at an angle of 45° to the arrangement direction of the discharge port.

6. A method for manufacturing an ink jet head provided with discharge port for discharging ink and a discharge port plate having said discharge port, comprising the following steps of:

closely contacting the mask plate having opening in the form of said discharge port with the face of the

said discharge port plate on the ink discharge side;
and

forming said discharge port on said discharge port
plate by irradiating plural high energy ultraviolet
5 parallel beams simultaneously through said mask plate
in the direction inclined at a specific angle to the
vertical axis of the mask plate face.

7. A method for manufacturing an ink jet head
10 according to Claim 6, wherein said discharge port
formation step is performed after said discharge port
plate is bonded to the ink jet head main body.

8. A method for manufacturing an ink jet head
15 according to Claim 6, wherein the irradiation of the
plural high energy ultraviolet parallel beams is
incident upon in the direction inclined at the same
angle to the vertical axis of the mask plate.

9. A method for manufacturing an ink jet head
20 according to Claim 6, wherein the irradiation of the
plural high energy ultraviolet parallel beams is
incident upon in the direction equally divided with
respect to the circumferential directions of the mask
25 plate.

10. A method for manufacturing an ink jet head

according to Claim 6, wherein the high energy
ultraviolet parallel beams are formed by two beams, and
each of the beams is inclined at a specific angle
symmetrical to the vertical axis of the mask plate, and
5 then, irradiated in the direction at right angles to
the arrangement direction of the discharge port.

11. A method for manufacturing an ink jet head
according to Claim 6, wherein the high energy
10 ultraviolet parallel beams are formed by four beams,
and each of the beams is inclined at a specific angle
to the vertical axis of the mask plate, and then,
irradiated in the direction equally divided with
respect to the circumferential directions of the
15 vertical axis and in the direction at an angle of 45° to
the arrangement direction of the discharge port.

12. A method for manufacturing an ink jet head
according to Claim 11, wherein said ink jet head is
20 provided with an ink flow paths communicated with said
ink discharge port, each having the rectangular
section, and said discharge port is arranged on the end
portion of said ink flow path.

25 13. A method for manufacturing an ink jet head
according to Claim 6, wherein said discharge port plate
is formed by resin.

14. A method for manufacturing an ink jet head according to Claim 6, wherein said discharge port plate is formed by silicon nitride.

5 15. A method for manufacturing an ink jet head according to Claim 6, wherein said high energy ultraviolet parallel beams are formed by the higher harmonic wave of excimer laser or YAG laser.

10 16. A method for processing the discharge port of an ink jet head according to Claim 1, wherein said closely contacted mask plate and said discharge port plate are rotated around said vertical axis with said vertical axis as the rotational axis thereof.

15 17. A method for manufacturing an ink jet head according to Claim 6, wherein said closely contacted mask plate and said discharge port plate are rotated around said vertical axis with said vertical axis as
20 the rotational axis thereof.

25 18. A method for processing the discharge port of an ink jet head according to Claim 1, wherein after a sacrificing layer formed by a material processible by said high energy ultraviolet parallel beams is closely contacted with the outer face of said discharge port plate, the high energy ultraviolet parallel beams are

irradiated onto said discharge port plate through said mask plate, and then, said sacrificing layer is peeled to be removed by a chemical or physical method.

5 19. A method for processing the discharge port of
an ink jet head according to Claim 1, wherein after a
sacrificing layer formed by a material processible by
said high energy ultraviolet parallel beams is closely
10 contacted with the outer face and the inner face of
said discharge port plate, the high energy ultraviolet
parallel beams are irradiated onto said discharge port
plate through said mask plate, and then, said
sacrificing layer is peeled to be removed by a chemical
or physical method.

15 20. A method for processing the discharge port of
an ink jet head according to Claim 18 or Claim 19,
wherein said sacrificing layer is formed by coating
water soluble resin on the discharge port plate, and
20 the sacrificing layer is removed by washing after the
discharge port is formed.

25 21. A method for processing the discharge port of
an ink jet head according to Claim 18 or Claim 19,
wherein said sacrificing layer is formed by thin resin
film adhering to the discharge port plate in vacuum,
and the sacrificing layer is removed by mechanically

peeled off after the discharge port is formed.

22. A method for manufacturing an ink jet head according to Claim 1, wherein after a sacrificing layer
5 formed by a material processible by said high energy ultraviolet parallel beams is closely contacted with the outer face of said discharge port plate, the high energy ultraviolet parallel beams are irradiated onto said discharge port plate through said mask plate, and
10 then, said sacrificing layer is peeled to be removed by a chemical or physical method.

23. A method for manufacturing an ink jet head according to Claim 1, wherein after a sacrificing layer
15 formed by a material processible by said high energy ultraviolet parallel beams is closely contacted with the outer face and the inner face of said discharge port plate, the high energy ultraviolet parallel beams are irradiated onto said discharge port plate through
20 said mask plate, and then, said sacrificing layer is peeled to be removed by a chemical or physical method.

24. A method for manufacturing an ink jet head according to Claim 22 or Claim 23, wherein said
25 sacrificing layer is formed by coating water soluble resin on the discharge port plate, and the sacrificing layer is removed by washing after the discharge port is

formed.

25. A method for manufacturing an ink jet head according to Claim 22 or Claim 23, wherein said
5 sacrificing layer is formed by thin resin film adhering to the discharge port plate in vacuum, and the sacrificing layer is removed by mechanically peeled off after the discharge port is formed.

10 26. A method for processing the discharge port of an ink jet head according to Claim 1, wherein for said discharge port plate, a plurality of said discharge port are one dimensionally arranged or the arrangement of plural discharge port is made in plural lines for
15 formation, and said closely contacted mask plate and said discharge plate perform one or more reciprocative scannings with respect to the irradiating area of the high energy ultraviolet beams.

20 27. A method for processing the discharge port of an ink jet head according to Claim 26, wherein said reciprocative operations are performed continuously.

25 28. A method for processing the discharge port of an ink jet head according to Claim 26, wherein said reciprocative operations are performed stepwise.

29. A method for manufacturing an ink jet head according to Claim 6, wherein for said discharge port plate, a plurality of said discharge port is one dimensionally arranged or the arrangement of plural discharge port is made in plural lines for formation, and said closely contacted mask plate and said discharge plate perform one or more reciprocative scannings with respect to the irradiating area of the high energy ultraviolet beams.

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30. A method for manufacturing an ink jet head according to Claim 29, wherein said reciprocative operations are performed continuously.

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31. A method for manufacturing an ink jet head according to Claim 29, wherein said reciprocative operations are performed stepwise.